Mach Effect Thruster Development

H. Fearn and J. F. Woodward

California State University Fullerton Physics Department

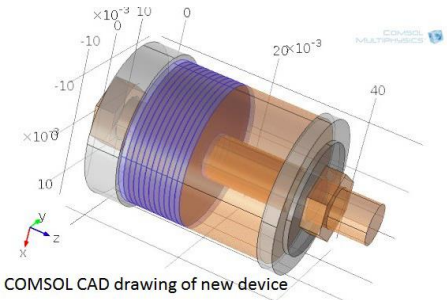
800 N. State College Blvd. Fullerton, CA 92834 USA.

Ph. (657) 278 2767, Fax. (657) 278 2555

hfearn@fullerton.edu

The Mach Effect Thruster is a device which uses Mach's principle in gravitational theory to produce a constant acceleration in a device which is undergoing internal energy changes and mass fluctuations- as discussed in peer-reviewed papers spanning 20 years and a book by Woodward [1], and recently by HF [2-4]. The MET requires no fuel as a propellant needing only electric power of 100-200 Watts to operate. We regularly see a small amount of thrust in the laboratory using a piezoelectric device in a vacuum chamber mounted on a very sensitive torsion balance. Our goal is to increase the observed thrust by changing the construction of the device and the materials used. Further modeling (in the multi-physics finite element software COMSOL) and theoretical investigation is needed.

Here, we concentrate on the new experimental results of the previous 6 months. The emphasis has been on a new construction using a single central bolt and annular Lead Zirconate Titanate (PZT) disks. This arrangement closely resembles the readily available *tonpilz* transducers. Results obtained by varying the reaction mass, the pre-tensioning of the bolt and also the arrangement of the PZT crystals in the stack will be presented.



COMSOL CAD drawing of new device

[1] J. F. Woodward, *Making Starships and Stargates*, (Springer press Dec 2012).
[2] H. Fearn & J. F. Woodward, "Recent investigation of Mach effect thrusters", in the Proceedings of the 48th Joint Propulsion Conference, Altanta Georgia, 29th July 1st Aug (2012) by AIAA.
[3] H. Fearn & J. F. Woodward, "Experimental Null test of a Mach effect thruster", Jour. of Space Expl. Mehtpress (2013), online ISSN:2319-9822. (arXiv:1301:6178)
[4] H. Fearn and K. Wanser, ``Experimental Tests of the Mach Effect Thruster", (Accepted for publication in April 2014) to be Published in Jour. of Space Expl., Mehtpress (Dec. 2014).